

CLAIMS

- 5 1. A method for free-form fabrication of a solid three-dimensional object, comprising:
 a) ink-jetting a first ink-jettable composition including a reactive build material and a second ink-jettable composition including a curing agent separately onto a substrate such that contact between the reactive build
10 material and the curing agent occurs, thereby resulting in a reaction that forms a solidifying composition;
 b) repeating the ink-jetting step such that multiple layers of solidifying composition are accrued, wherein said multiple layers are successively bound to one another to form the solid three-dimensional object.
- 15 2. A method as in claim 1, wherein the substrate is a previously deposited solidifying composition.
- 20 3. A method as in claim 1, wherein the substrate of the ink-jetting step is a removable material selected from the group consisting of wax, patterned solidifying composition, water swellable gel, readily meltable material, readily soluble material, and wherein the substrate of each of the successive repeating steps includes a previously deposited solidifying composition.
- 25 4. A method as in claim 1, wherein first ink-jettable composition is underprinted with respect to the second ink-jettable composition.
5. A method as in claim 1, wherein the first ink-jettable composition is overprinted with respect to the second ink-jettable composition.

6. A method as in claim 1, wherein the first ink-jettable composition and the second ink-jettable composition are printed substantially simultaneously on the substrate.
- 5 7. A method as in claim 1, wherein the solid three-dimensional object, once substantially solidified, is highly cross-linked.
- 10 8. A method as in claim 1, wherein the reactive build material is an epoxy, and the curing agent includes molecules containing at least two active hydrogens for reacting with the epoxy to form the solidifying composition.
- 15 9. A method as in claim 1, wherein the reactive build material includes an isocyanate or polyisocyanate, and the curing agent includes an alcohol or polyol.
- 20 10. A method as in claim 1, wherein the reactive build material includes a functionalized silicone, and the curing agent is configured to react with the functional group on the silicone.
- 25 11. A method as in claim 1, wherein the first ink-jettable composition and the second ink-jettable composition each have a viscosity which is less than 70 cP at a temperature less than 200°C.
- 30 12. A method as in claim 1, further comprising the step of adding a colorant to at least one of the first ink-jettable composition and the second ink-jettable composition.
- 35 13. A system for free-form fabrication of solid three-dimensional objects, comprising a first ink-jettable composition including a reactive build material and a second ink-jettable composition including a curing agent, said reactive build material and said curing agent being configured to react with one another after contact to form a solidifying composition, said solidifying composition being

- configured to become chemically bound to subsequently applied solidifying compositions; and
- an ink-jet dispensing system configured for separately containing and dispensing the first ink-jettable composition and the second ink-jettable composition, wherein upon dispensing, the first ink-jettable composition and the second ink-jettable composition are configured to come in contact.
- 5 14. A system as in claim 13, wherein the solidifying composition, once substantially solidified, is highly cross-linked.
- 10 15. A system as in claim 13, wherein the reactive build material is an epoxy, and the curing agent includes molecules having at least two active hydrogens for reacting with the epoxy to form the solidifying composition.
- 15 16. A system as in claim 13, wherein the reactive build material includes an isocyanate or polyisocyanate, and the curing agent includes an alcohol or polyol.
- 20 17. A system as in claim 13, wherein the reactive build material includes a functionalized silicone, and the curing agent is configured to react with the functional group on the silicone.
- 25 18. A system as in claim 13, wherein the first ink-jettable composition and the second ink-jettable composition each have a viscosity which is less than 70 cP at a temperature less than 200°C.
- 30 19. A system as in claim 13, wherein at least one of the first ink-jettable composition and the second ink-jettable composition includes a colorant.

20. A system as in claim 13, further comprising a third ink-jettable composition and a fourth ink-jettable composition, wherein the first ink-jettable composition further includes a cyan colorant, the third ink-jettable composition includes a reactive build material and a magenta colorant, and the fourth ink-jettable composition includes a reactive build material and a yellow colorant.

21. A system as in claim 13, further comprising a third ink-jettable composition and a fourth ink-jettable composition, wherein the second ink-jettable composition further includes a cyan colorant, the third ink-jettable composition includes a curing agent and a magenta colorant, and the fourth ink-jettable composition includes a curing agent and a yellow colorant.

22. A solid three-dimensional object, comprising multiple layers of a solidifying composition bound to one another, each of said multiple layers formed by contacting a first ink-jettable composition containing a reactive build material with a second ink-jettable composition containing a curing agent, said curing agent being reactive with the reactive build material such that the solidifying composition is formable.

20 23. A solid three-dimensional object as in claim 22, wherein the solidifying composition, once substantially solidified, is highly cross-linked.

24. A solid three-dimensional object as in claim 22, wherein the reactive build material is an epoxy, and the curing agent includes molecules having at least two active hydrogens for reacting with the epoxy to form the solidifying composition.

25. A solid three-dimensional object as in claim 22, wherein the reactive build material includes an isocyanate or polyisocyanate, and the curing agent includes an alcohol or polyol.

26. A solid three-dimensional object as in claim 22, wherein the reactive build material includes a functionalized silicone, and the curing agent is configured to react with the functional group on the silicone.

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27. A solid three-dimensional object as in claim 22, wherein the color of the solid three-dimensional object is modified by at least one of cyan, magenta, and yellow.

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